

tions, and to the instances of anencephalous infants, as leading to the following deductions:—

1. In man and the higher mammalia, the brain is the sole centre of the nervous system and the source of its power.

2. The grey matter of the spinal chord and the ganglia of the sympathetic are to be considered as reservoirs of this power, for the immediate action of the parts supplied, which speedily become exhausted if communication with the brain be cut off; and also as modifiers of impressions transmitted from the organs of the brain.

3. The automatic and instinctive actions are not performed independently of the concurrence of the brain, though its influence on these actions is less direct and manifest than in the case of voluntary movements.

4. In several disorders which have been too exclusively referred to the spinal chord, the brain is the organ principally implicated.

“On the Protection of Iron from Oxidation and from becoming foul when it is exposed to the action of sea and other waters.” By Mr. William John Hay. Communicated by Admiral Beaufort, F.R.S.

For attaining the objects mentioned in the title of this paper, the author was led by a process of experimental research, founded on chemical principle, to the discovery of the superior efficacy of a varnish consisting of one part of pitch and two parts of naphtha, together with ten pounds of the sub- and per-oxides of copper to each quart of the varnish. This varnish is made to adhere by applying it to the iron previously rendered hot by placing underneath it braziers of ignited charcoal. He found that this coating of varnish not only protected the iron from oxidation, but formed a perfect barrier to electro-chemical action between the copper oxide and the iron. Two or three of these coats are applied in succession, each being laid on after the preceding one has become hardened. The trials made of this method on various ships, the results of which are detailed in an appendix to the paper, have proved perfectly satisfactory.

May 11, 1848.

The MARQUIS OF NORTHAMPTON, President, in the Chair.

“On the Chemical Nature of a Wax from China.” By Benjamin Collins Brodie, Esq. Communicated by Sir Benjamin Collins Brodie, Bart., F.R.S.

The wax which is the subject of this investigation, is a substance imported into this country from China. It has the general appearance of spermaceti, but is harder than that body. The author gives reasons for believing that this wax, like bees'-wax, is a secretion from an insect.

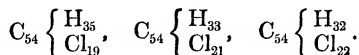
The wax may be decomposed by fusion with hydrate of potash, by which process two substances are procured; namely, a wax acid, which, combined with the potash, forms a soap; and another body which is dissolved in the soap solution. By precipitation with chloride of barium and washing out the dried baryta salt with ether, or other suitable solvents, the two substances may be separated.

The substance dissolved in the ether has the appearance of a wax. By crystallization its melting-point may be raised to 79° C., at which point it is fixed. The body, when analysed, gave numbers agreeing with the formula $C_{54}H_{56}O_2$, the formula, namely, of the alcohol of cerotic acid, the acid which in a previous paper the author has shown to exist in a free condition in bees'-wax, and the constitution of which he there determined. To this alcohol the author gives the name of *cerotine*. By oxidation, by means of lime and potash, the alcohol is capable of being converted into cerotic acid, $C_{54}H_{54}O_4$. The analyses of the acid and of its silver salt are given. The formula of the alcohol is further confirmed by the analysis of its combination with sulphuric acid; and the process to be employed to procure this substance is detailed. Its formula is $SO_3, C_{54}H_{55}O + HO$; the sulphate of the oxide of cerotyle, using the usual chemical language to express the nature of the combination. By the action of chlorine on the alcohol, the alcohol-type is destroyed, and a body is formed, analogous to chloral, containing two equivalents of hydrogen less than the alcohol itself. The analyses lead to the formula

$C_{54} \left\{ \begin{array}{l} H_{40\frac{1}{2}} \\ Cl_{13\frac{1}{2}} \end{array} \right. O_2$. The substance has the appearance of a resin.

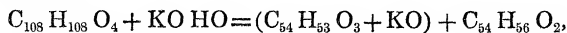
By decomposing the above-mentioned baryta salt, after the cerotine has been entirely removed by washing with suitable solvents, the same cerotic acid may be obtained as that into which the alcohol itself is converted by oxidation. The analysis of the acid and of its silver salt is given.

This Chinese wax cannot be distilled without decomposition. By its distillation two substances are procured; cerotic acid, $C_{54}H_{54}O_4$, and hydrocarbon. The hydrocarbon consists principally of a solid matter, one of those substances which, in the opinion of the author, have been indiscriminately classed together under the general name of *paraffine*. This substance, to which he gives the name of *cerotine*, contains equal equivalents of hydrogen and carbon, and has the formula $C_{54}H_{54}$. This formula is determined with precision by the action of chlorine on the substance, which gives rise to a series of products of substitution, of which several were analysed, namely the substances

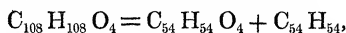


The density of the vapour of cerotine cannot be taken, as, by distillation, it is decomposed. The experiment was made of distilling and redistilling the substance in a sealed tube, in which cases it passes entirely into fluid and gaseous hydrocarbon.

The analysis of the Chinese wax itself corresponds with the formula $C_{108}H_{108}O_4$, which admits of a simple explanation of the nature of its decompositions: its decomposition by potash being explained by the equation



and its decomposition by heat by the equation



the substance itself belonging to the class of compound ethers.

The author announces his intention of following up this paper by a third on the constitution of myricine.

May 18, 1848.

The MARQUIS OF NORTHAMPTON, President, in the Chair.

“On a new case of the Interference of Light.” By the Rev. Baden Powell, M.A., F.R.S. &c., Savilian Professor of Geometry in the University of Oxford.

The principal experiment exhibiting the newly-observed case of interference described by the author, is the following: into a hollow prism or trough containing oil of sassafras, anise, cassia, &c., a plate of glass is dipped so as to intercept the light passing through the upper or thicker half of the prism, and leave the lower half clear: the spectrum of a line of light or narrow slit, is then immediately seen to be covered with dark bands parallel to the slit or edge of the prism.

Some substances, as oil of turpentine, water, &c., give no bands with this arrangement, but will give them, if a complementary arrangement be adopted, viz. by placing a narrow slip of glass at the bottom of the prism, or so as to intercept the light passing through the thinner half.

The production of the bands in general, and the reason of the difference existing in the cases referred to, are fully accounted for on the theory of waves and interference: whence the following formula is deduced, giving the number of bands (n), when μ_p and μ_m , the indices for any ray for the plate and for the medium, are known, of which λ is the wave length; and taking these quantities for any two rays (1) and (2) of the spectrum, τ being the thickness of the plate, we have the number of bands between them expressed by

$$n = \left\{ \left(\frac{\mu_p - \mu_m}{\lambda} \right)_1 - \left(\frac{\mu_p - \mu_m}{\lambda} \right)_2 \right\} \tau.$$

The numbers thus calculated agree with observation for many media. The distinction of the two cases alluded to depends on whether n result positive or negative; that is, on the relative values of the indices; also agreeing with observation.